

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claim 1 (Currently Amended): An audio processor which processes an input data stream via an external memory device, comprising:

~~a control device processor connected to the external memory device which stores programs and data streams used for sequentially executing a plurality of processes, the control device being configured to fetch in, when executing one of the processes~~ divided procedures of an audio process, a program and audio data stream corresponding to a next one of the ~~processes~~ procedures from the external memory device which stores programs and a group of data used for sequentially executing the divided procedures of the audio process;

~~an internal memory connected to the control device and configured to store the program and~~ audio data stream read fetched from the external memory device by the control processor and corresponding to the one and the next one of the ~~processes~~ procedures; and

~~a data processor coprocessor connected to~~ subserve the internal memory control processor and configured to subject audio data of the input data stream to the process the divided procedures of the audio process based on the program and ~~data stream read from the internal memory~~ fetched by the control processor.

Claim 2 (Currently Amended): An audio processor according to claim 1, wherein ~~the input data stream includes an audio data stream, and the data processor sequentially subjects the coprocessor is configured to subserve the control processor to subject sequentially the~~ audio data stream to decoding, noise-less decoding, noise reduction, filter bank, and block switching in accordance with the programs and data ~~streams read~~ fetched from the external memory device in units of one ~~process procedure~~.

Claim 3 (Currently Amended): An audio processor according to claim 2, wherein the ~~data processor~~ coprocessor is configured to subserve the control processor to execute the program fetched in the internal memory from the external memory device in accordance with progress of the ~~processes~~ procedures of the audio process.

Claim 4 (Cancelled).

Claim 5 (Cancelled).

Claim 6 (Currently Amended): An audio processor according to claim [[5]] 1, wherein the internal memory comprises an instruction memory configured to store an instruction group of the program transferred from the external memory device and a data memory configured to store a data group transferred from the external memory device, and the ~~data processor performs~~ coprocessor subserves the control processor to perform the process based on the instruction group using the data in the data memory and data corresponding to a progress stage of audio data reconstruction to generate audio data.

Claim 7 (Original): An audio processor according to claim 6, which includes a DMA controller configured to control writing of data to the external memory device, the instruction memory and the data memory, and reading of the data therefrom by a direct access memory transfer.

Claim 8 (Currently Amended): An audio processor according to claim [[5]] 1, wherein the control ~~device~~ processor sequentially transfers a plurality of program modules corresponding to the plurality of ~~processes~~ procedures of the audio process to the ~~data processor~~ coprocessor from the external memory device according to the progress of the ~~processes~~ procedures.

Claim 9 (Currently Amended): An audio processor according to claim [[5]] 1, wherein the ~~data processor executes~~ coprocessor subserves the control processor to execute decoding of bit stream data, noiseless decoding, inverse quantization, scale factor, TNS processing, filter bank processing, and the block switching, in this order, to reconstruct audio data.

Claim 10 (Currently Amended): An audio processor according to claim 9, wherein the ~~data processor~~ control processor includes a function of predicting which ~~process~~ procedure is performed after the ~~process~~ procedure which is currently performed.

Claim 11 (Currently Amended): An audio processor according to claim 7, wherein the internal memory stores a program module which request the DMA controller for preparing, while continuing the ~~processing~~ procedure which is currently performed, the data group and instruction group that are required for the next ~~process~~ procedure.

Claim 12 (Currently Amended): An audio processor according to claim 11, wherein a DMA transfer instruction is added to the program module in order to read the program module used in the next ~~process~~ procedure from the external memory ~~device~~, the DMA transfer instruction allowing to read the program module with the DMA transfer by specifying the storage area.

Claim 13 (Currently Amended): An audio processor according to claim [[5]] 1, ~~wherein the processor~~ which allows data which is determined to be unused for a long time to be saved from the internal memory to the external memory ~~device~~.

Claim 14 (Currently Amended): An audio processor according to claim 13, ~~wherein~~ the ~~processor~~ which releases the storage region of the data or the program which becomes unnecessary.

Claim 15 (Currently Amended): A data processing apparatus for processing an input data stream via an external memory device comprising:

a ~~control device~~ processor configured to fetch in a program and data to be used for a next procedure of an audio process from programs for encoding and decoding, input/output data, work data, table data which are stored in the external memory ~~device~~;

a ~~data processor configured~~ coprocessor to subserve the control processor to perform data processing for coding or decoding according to the ~~programs~~ program fetched by the control ~~device~~ processor;

a data memory ~~configured~~ to store the data fetched by the control ~~device~~ processor;

an instruction memory ~~configured~~ to store the programs to be applied to the control processor; and

a DMA controller ~~configured~~ to transfer the data among the instruction memory and the data memory and the external memory,

the ~~data processor~~ control processor controlling the DMA controller to perform the encoding and the decoding using the coprocessor, read program and data required for the next ~~process~~ procedure from the external memory, and write data obtained by the ~~process~~ procedure into the external memory ~~device~~.

Claim 16 (Currently Amended): An audio processor according to claim 15, wherein the ~~data processor~~ coprocessor temporally stops when accessing of the DMA controller to the instruction memory or the data memory competes with accessing of the ~~data processor~~ coprocessor to the instruction memory or the data memory.

Claim 17 (Currently Amended): An audio data processing method for processing an input data stream using a program stored in an external memory, comprising:

~~preparing an external memory device which stores~~ storing programs and audio data streams used for sequentially executing a ~~plurality of processes~~ divided procedures of an audio process,

fetching in, when executing one of the ~~processes~~ procedures, a program and data ~~stream~~ corresponding to next one of the ~~processes~~ procedures from the external memory ~~device~~ using a control processor;

storing the program and audio data ~~stream~~ read from the external memory ~~device~~ and corresponding to the one and next one of the ~~processes~~ procedures in ~~[[a]]~~ an internal memory; and

subjecting the input data stream to the audio process via a coprocessor based on the program and data ~~stream~~ read from the internal memory.

Claim 18 (Currently Amended): A method according to claim 17, wherein the input data stream includes ~~an~~ audio data ~~stream~~, and the subjecting ~~step~~ sequentially subjects the audio data ~~stream~~ to decoding, noise-less decoding, noise reduction, filter bank, and block switching in accordance with the programs and audio data ~~streams~~ read from the external memory ~~device~~ in units of one ~~process~~ procedure.

Claim 19 (Currently Amended): An audio data processing method for sequentially subjecting input data to a plurality of ~~processes~~ procedures of an audio process, comprising:

storing a plurality of program modules corresponding to the plurality of ~~processes~~ procedures and data to be processed in an external memory;

reading, when executing one process, a program module and ~~data~~ to-be-processed data which are used for a next procedure of the audio process from the external memory a control processor; and

processing audio data of the readout data via a coprocessor in accordance with the readout program module.

Claim 20 (New): An audio processor according to claim 1, wherein said coprocessor is configured to process only audio data.